

APPROVED FOR RELEASE



PHYSICS OF THE COSMOS  
PROGRAM ANALYSIS GROUP

REPORT TO THE APAC  
GRANT TREMBLAY  
21 JULY 2022





# PHYSICS OF THE COSMOS

## PROGRAM ANALYSIS GROUP

### The 2022 PhysPAG Executive Committee

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Chair	Grant <b>Tremblay</b>	Smithsonian Astrophysical Observatory
Vice Chair	Justin <b>Finke</b>	U.S. Naval Research Laboratory
Chair Emeritus	Ryan <b>Hickox</b>	Dartmouth College
	Sean <b>McWilliams</b>	West Virginia University
	Bindu <b>Rani</b>	NASA Goddard Space Flight Center / SURA / KASI
	Vera <b>Gluscevic</b>	University of Southern California
	Andrew <b>Romero-Wolf</b>	Jet Propulsion Laboratory
	Eric <b>Burns</b>	Louisiana State University
New Members!	Kristin <b>Madsen</b>	UMBC / NASA Goddard Space Flight Center
	Athina <b>Meli</b>	North Carolina Agricultural & Technical State Univ.
	David <b>Pooley</b>	Trinity University

### PhysCOS NASA Colleagues

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PS	Valerie <b>Connaughton</b>
DPS	Sanaz <b>Vahidinia</b>
CS	Brian <b>Humensky</b> <b>New!</b> (thank you Brian Williams!)

### Currently Active Science Interest Groups

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**X-ray** SIG

**Gravitational Wave** SIG

**Gamma Ray** SIG

**Cosmic Ray** SIG

**Cosmic Structure** SIG

**Inflation Probe** SIG    *Sunsetting proposed*



# PhysPAG Activities (since the March 2022 APAC)

**Three new SAGs** now ready for APAC review, APD sign-off, and startup

New Great Observatories SAG, Gamma-ray Transient Network SAG, Expanding Participation in Astronomy (AWESOM) SAG. All TORs now ready for approval.

Successful **CRSIG Meeting** at April APS Meeting (NYC)

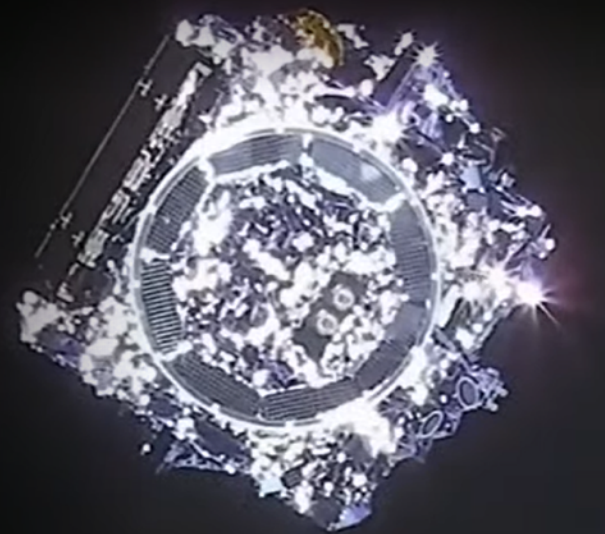
Successful & well-attended PAG meetings at AAS 240 (Pasadena)

Joint PAG meeting (70 people), PhysPAG Meeting (24 people), XRSIG Town Hall (48 people), GR SIG Town Hall (22 people)

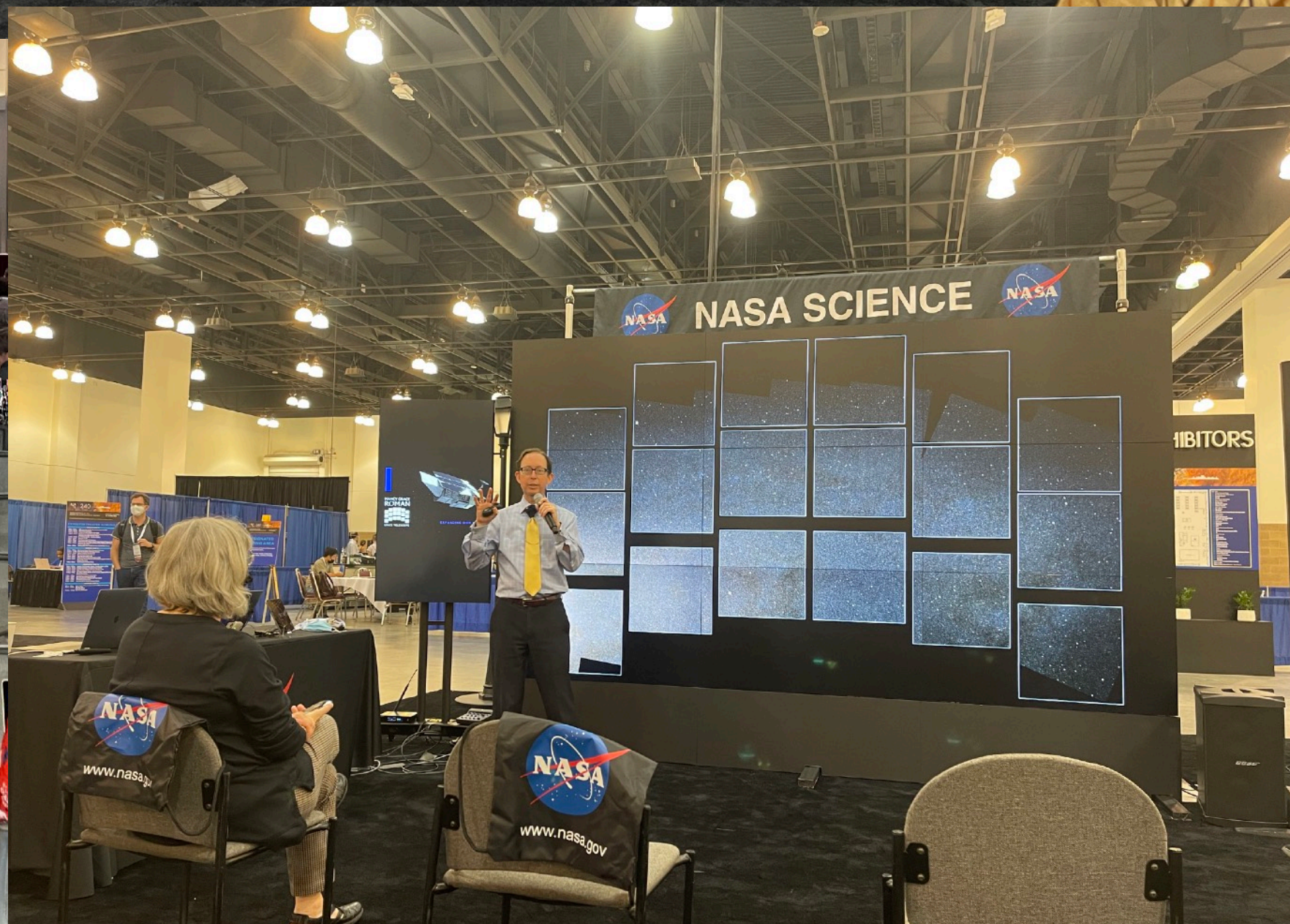
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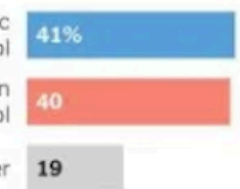


STARS ARE BORN The cliffs of the Carina nebula, captured by the James Webb Space Telescope. Its images revealed the earliest periods of star formation.

## Term Race Tight, Polling Shows

By NATE COHN  
President Biden's approval  
dropped in the 30s and with  
percent of voters saying  
he is heading in the  
wrong direction, all the ingredi-  
ents are in place for a Re-  
sweep in the November  
elections.  
Democrats and Republi-

### Our preference for the outcome of the 2022 midterm elections?



New York Times/Siena College poll  
of registered voters from July 5-7.  
THE NEW YORK TIMES

in the campaign in a sur-  
prise close race for control  
of Congress according to the first  
New York Times/Siena College  
poll of the cycle.

among registered vot-  
ers said they preferred  
Biden to control Congress  
with 40 percent who  
preferred Republican control.

## For DeSantis, Rare Silence On Abortion

This article is by Maggie Ha-  
berman, Patricia Mazzei and Mi-  
chael C. Bender.

When the Supreme Court  
crushed the constitutional right to  
an abortion last month, Gov. Ron  
DeSantis of Florida was among  
the many Republicans who cele-  
brated. "The prayers of millions  
have been answered," he tweeted.  
But while other Republican  
leaders vowed to charge ahead  
with new restrictions — or near-  
total bans — Mr. DeSantis offered  
only a vague promise to "work to  
expand pro-life protections."

More than two weeks later, he  
has yet to explain what that  
means.

Mr. DeSantis, a favorite among  
those Republicans who want to  
move on from the Trump era, is  
rarely a reluctant partisan war-  
rior. But his hesitance to detail his  
plans for abortion policy reflects  
the new and, in some states, dif-  
ficult political terrain for Republi-  
cans in the post-Roe v. Wade era,  
as Democrats grasp for advan-  
tage on the issue in an otherwise  
largely hostile midterm election  
year.

In April, Mr. DeSantis signed a  
law barring abortions after 15  
weeks of pregnancy, bringing the  
state's limit down from 24 weeks.

## A Stunning New Peek Into the Ancient Cosmos

This article is by Dennis Overbye,  
Kenneth Chang and Joshua Sokol.

The universe was born in dark-  
ness 13.8 billion years ago, and  
even after the first stars and gal-  
axies blazed into existence a few  
hundred million years later, these  
too stayed dark. Their brilliant  
light, stretched by time and the  
expanding cosmos, dimmed into  
the infrared, rendering them —  
and other clues to our beginnings  
— inaccessible to every eye and

### Webb Telescope Shows Previously Invisible Details of Universe

instrument.

Until now. On Tuesday the  
James Webb Space Telescope, the  
most powerful space observatory  
yet built, offered a spectacular  
slide show of our previously in-

visible nascent cosmos. Ancient  
galaxies carpeting the sky like  
jewels on black velvet. Fledgling  
stars shining out from deep within  
cumulus clouds of interstellar  
dust. Hints of water vapor in the  
atmosphere of a remote exo-  
planet.

Their sum is both a new vision  
of the universe and a view of the  
universe as it once appeared new.  
"That was always out there,"  
said Jane Rigby, an astrophysicist

Continued on Page A12



## TRUMP TO SEND TO DISR

### A LAST-D

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By LUKE  
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Continue



La tour Eiffel  
@LaTourEiffel

Le 📡 spatial James #Webb révèle au monde la 1ère  
🌌 de notre jeune univers. Pour célébrer cette merveille  
je scintillerai à 23h30 ✨

Our early universe revealed thanks to #Webb! I will  
sparkle tonight 11.30pm to celebrate this wonder.

@ESA\_Webb  
@Arianespace  
@NASAWebb  
@arianegroup

Translate Tweet



217.9K views 0:08 / 0:13





# PhysPAG Activities (since the March 2022 APAC)

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Joint PAG meeting (70 people), PhysPAG Meeting (24 people), XRSIG Town Hall (48 people), GR SIG Town Hall (22 people), Great Observatories Splinter (160 people)

Planning for upcoming SACNAS, NSBP, and AAS 241 Meetings

Regular Executive Committee, SIG, and EC Chair Meetings

Expanded Cross-PAG coordination between ECs



Three new SAGs for APAC Consideration:

*THE NEW GREAT OBSERVATORIES*  
*SCIENCE ANALYSIS GROUP*



**GAMMA RAY TRANSIENT NETWORK**  
*SCIENCE ANALYSIS GROUP*



**ASTROPHYSICS WITH EQUITY**  
*SURMOUNTING OBSTACLES TO MEMBERSHIP*  
*SCIENCE ANALYSIS GROUP*

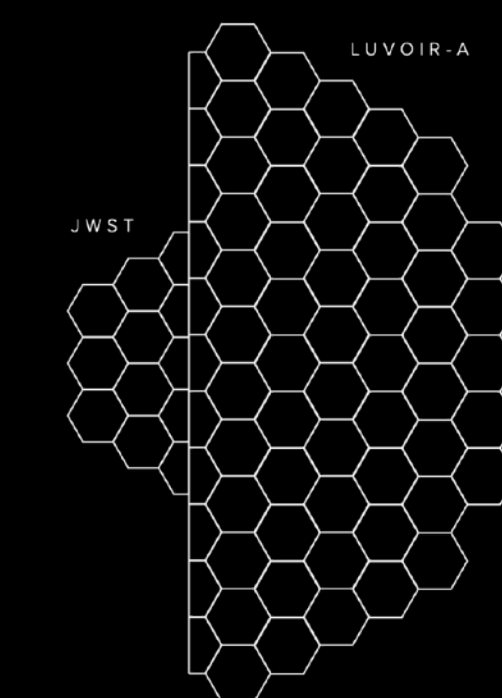


# THE NEW GREAT OBSERVATORIES SCIENCE ANALYSIS GROUP

A proposed **Cross-PAG SAG** on scientific advances enabled by a **fleet** of future Great Observatories

Draft terms of reference are ready, and vetted by APD and all three PAG Executive Committees

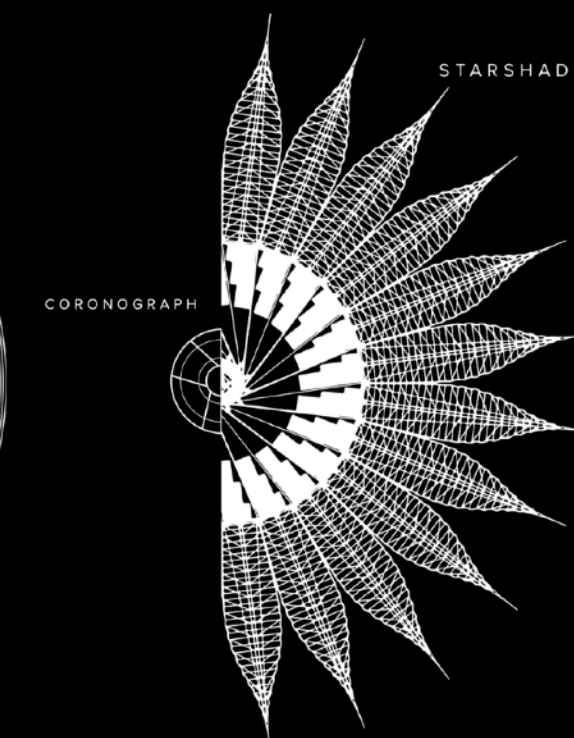
If approved, we are ready **now** to solicit a broad and inclusive slate of community participants *including in SAG leadership roles*. We hope to start work **this fall**.



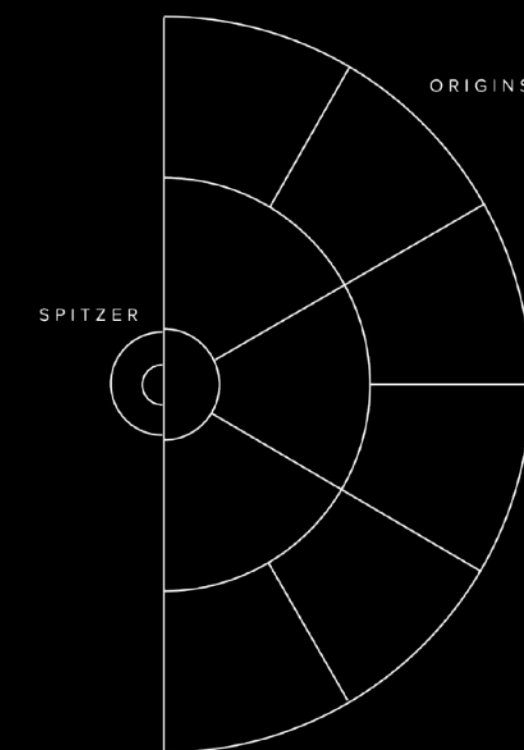
LARGE & STABLE  
APERTURES



LIGHTWEIGHT &  
HIGH RESOLUTION  
X-RAY OPTICS



HIGH-CONTRAST  
IMAGING *for*  
OTHER EARTHS



ULTRA-COLD OPTICS  
*for* FAR-INFRARED





# THE NEW GREAT OBSERVATORIES SCIENCE ANALYSIS GROUP

## TERMS OF REFERENCE

To what degree can the Key Science Questions from Astro2020 be advanced by *contemporaneous flight* of current, imminent, and future IR/O/UV, X-ray, and FIR Great Observatories? What discoveries in the Astro2020 priority areas might *uniquely* be made possible by coordinated use of X-ray through FIR space observatories using powerful and varied instruments? How might gaps be closed by the notional future multi-scale and multi wavelength portfolio, including future explorers and probes?

In the scenario that any or all of these missions not be launched, or if any should not see contemporaneous flight with one another, what are the corresponding scientific impacts with regards to loss of discovery space or inability of the community to address the priority areas of Astro2020?

READ THE FULL DRAFT CHARTER [HERE](#)





# GAMMA RAY TRANSIENT NETWORK

## SCIENCE ANALYSIS GROUP

A proposed **PhysPAG SAG** on InterPlanetary Networks (IPNs) and gamma-ray transients.

Chairs: Eric Burns & Michael Coughlin with broad & inclusive community participation

### A B R I D G E D   T E R M S   O F   R E F E R E N C E

What time-domain and multi messenger sources rely on the InterPlanetary Network? What would be lost if the IPN ends?

Where can improvements be made to the existing IPN? What are the needs of the community, especially w.r.t. fast radio bursts, optically-identified relativistic transients, and the gravitational wave and neutrino communities?

What benefits would extending the IPN beyond the current gamma-ray instruments bring? What future missions and instruments are needed to fully realize the Decadal-recommended science in partnership with advancing capabilities in other wavelengths and other messengers?

R E A D   T H E   F U L L   D R A F T   C H A R T E R   H E R E





# ASTROPHYSICS WITH EQUITY

SURMOUNTING OBSTACLES TO MEMBERSHIP  
SCIENCE ANALYSIS GROUP

A proposed **Cross-PAG SAG** (aka AWESOM) on *increasing participation* in NASA Astrophysics.

SAG deliverables are one or more white papers on:

Analysis as to how existing NASA programs and potential new initiatives can **increase engagement with research and training programs**, and to make available opportunities **clearer, more consistent, and easier to access**.

How to expand the range of **institutions and backgrounds** for members of the community contributing to NASA astrophysics.

SAG membership open to any interested community member. SAG will specifically engage colleagues from BIPOC communities as well as those from institutions that are underrepresented in NASA research and education programs.

READ THE FULL DRAFT CHARTER HERE

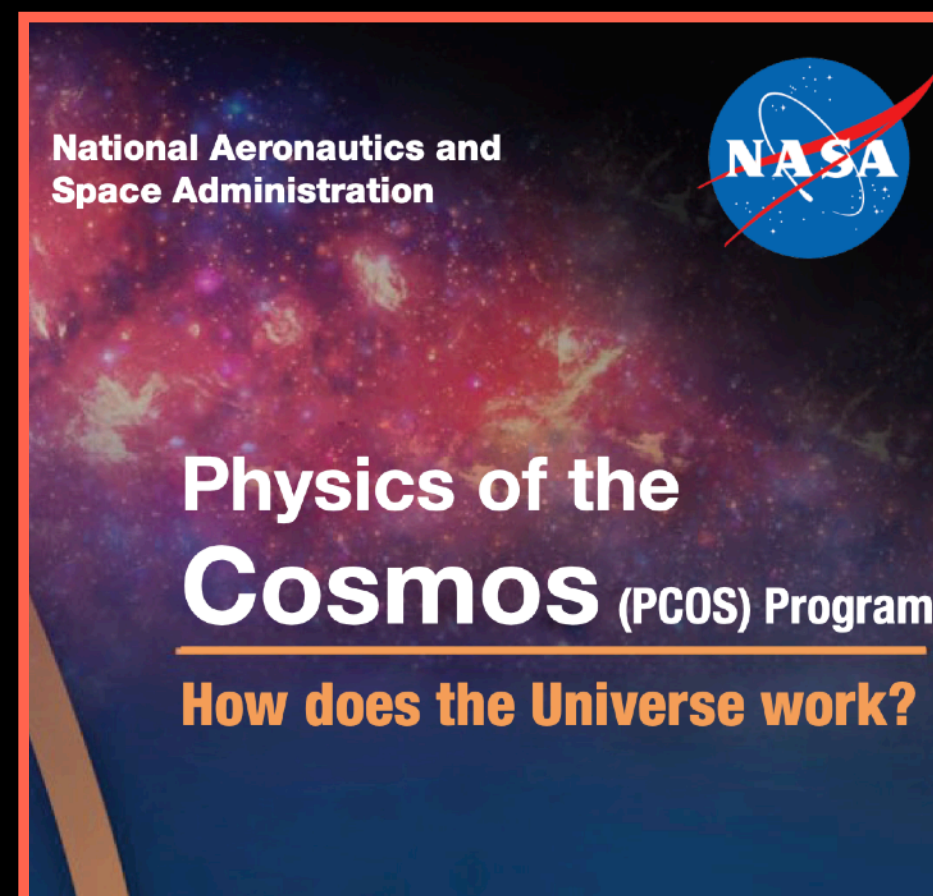


## Ending use of the “PCOS” acronym to refer to Physics of the Cosmos

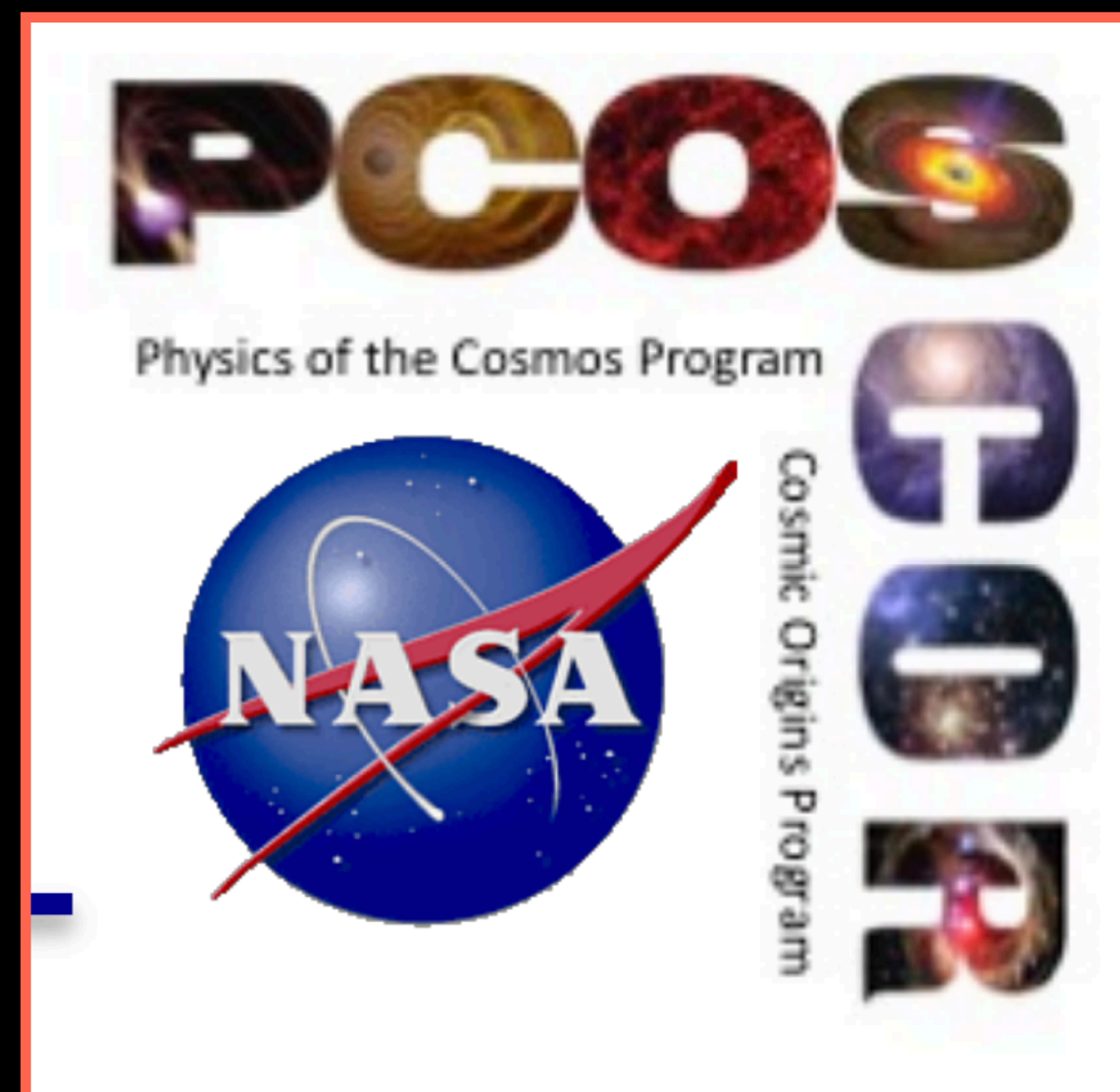
We have used the acronym “**PCOS**” to refer to the **Physics of the Cosmos Program** since at least ~2010. The acronym has been in use for as long as the program has existed, forming shortly after Beyond Einstein Program ended.

“PCOS” is **deeply embedded within NASA**, including URL subdomains, newsletters, many digital/physical documents, etc.

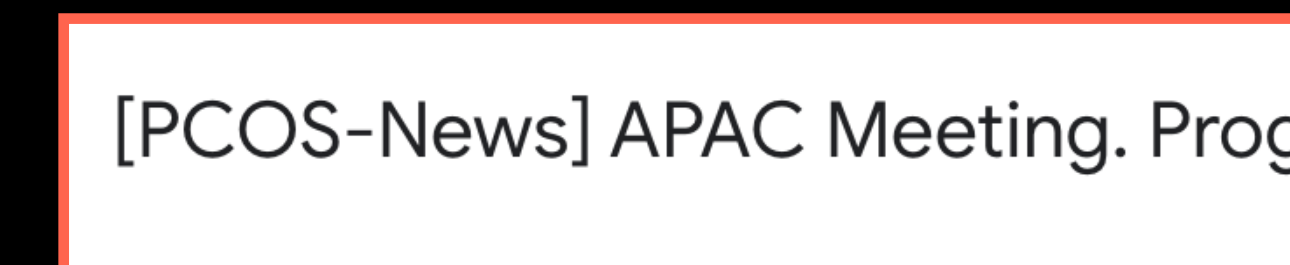
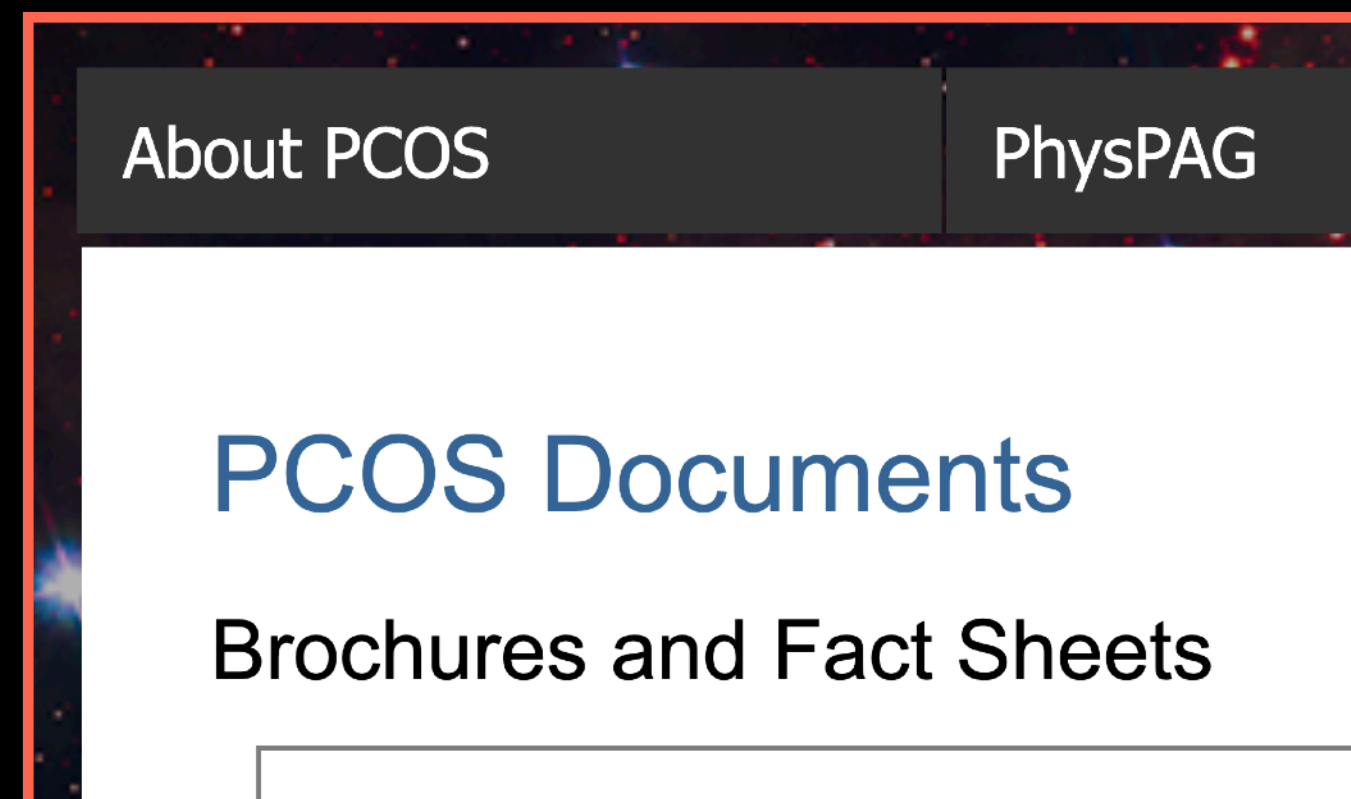
GSFC subdomain is called “pcos”



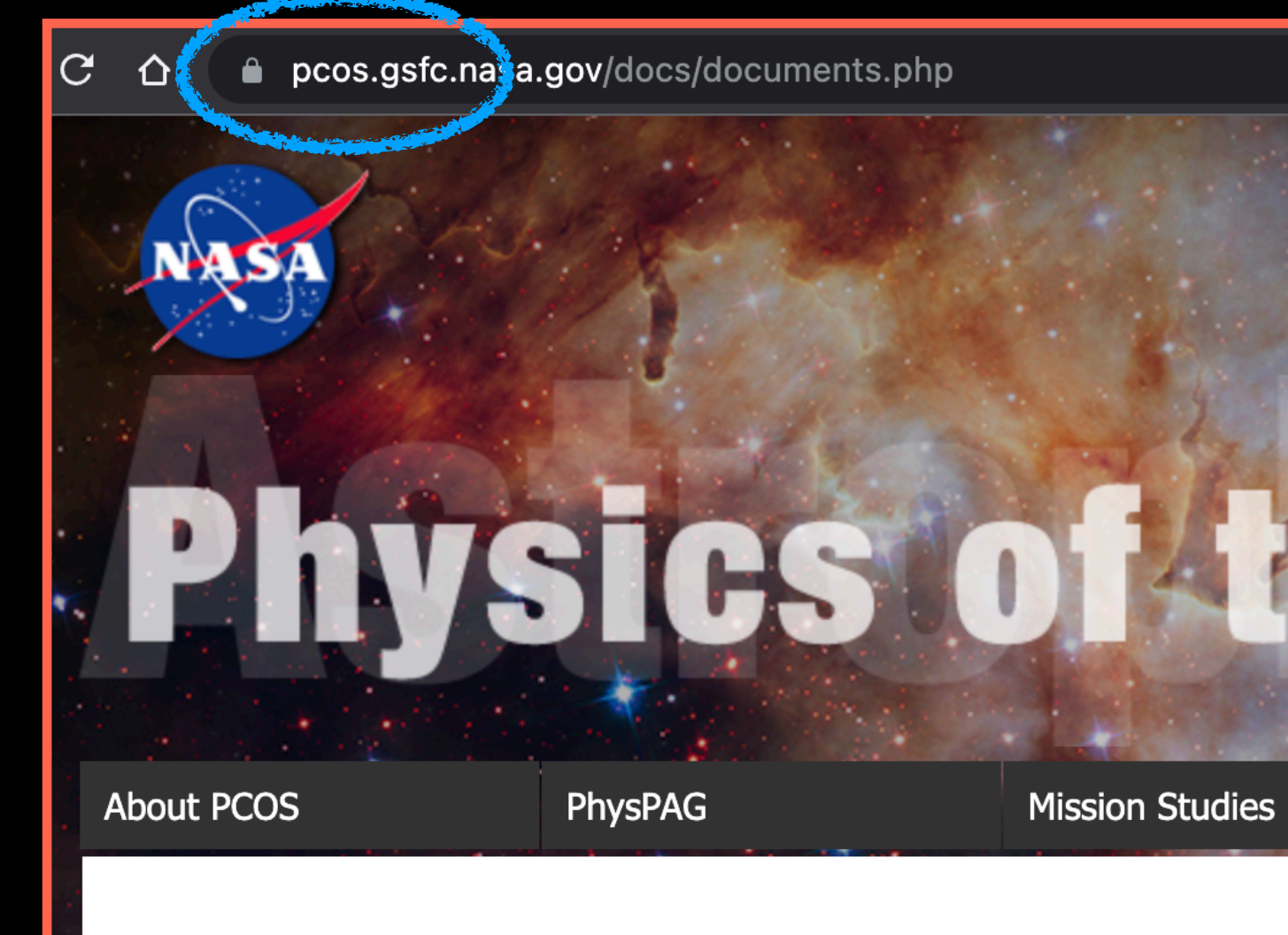
Printed brochure from 2011



Wordmarks



Hundreds of webpages, mailing list names, etc.



All GSFC content is under **pcos** subdomain



## Ending use of the “PCOS” acronym to refer to Physics of the Cosmos

### Polycystic Ovary Syndrome (PCOS)

Polycystic (pronounced pah-lee-SIS-tik) ovary syndrome, or PCOS, is a set of symptoms related to a hormonal imbalance that can affect women and girls of reproductive age.

Official NIH registry for PCOS

**Overwhelmingly**, the acronym “PCOS” is publicly associated with a difficult syndrome that impacts **many millions** worldwide (at *least* 1.5M *new* cases per year<sup>1</sup> and broadly undiagnosed). For the overwhelming majority of people (including astronomers), PCOS only means one thing (and it’s not NASA’s program). Searching “PCOS” on Google results in *at least* 20 pages of URLs about the syndrome (the page at Goddard is nowhere to be found).

<sup>1</sup>Liu et al. 2021, *Human Reproduction*, Volume 36, Issue 4, April 2021



## Ending use of the “PCOS” acronym to refer to Physics of the Cosmos

We have received community feedback that use of this acronym is both unwelcome and confusing.

The PhysPAG EC was unanimous in asking if APAC may consider a recommendation that, *moving forward*, **NASA discontinue use of the PCOS acronym.**

We propose a new shorthand:

PCOS → **PHYS**COS

Pronounceable, obvious, consistent with “**Phys**PAG”, similar in style to ExEP, etc.

It is surely not practical to **retroactively** change “PCOS” in existing documents and infrastructure. But we could use the new acronym going forward, including e.g. in NASA’s forthcoming IT infrastructure overhaul, creation of the new PhysCOS website at GSFC, etc.



## Consider sunseting the PhysPAG's Inflation Probe SIG

**Formed in 2012**, the PhysPAG's **Inflation Probe SIG**'s goal was to provide metrics and assessments to NASA in regard to a future **Inflation Probe mission**.

The SIG has done **great work** over the years, and broad interest continues in a future inflation probe mission.

In the wake of Astro2020 and its prioritizations (e.g. the X-ray/FIR Probe AO for this decade), a SIG specific to an inflation probe mission is probably better incorporated into a new PhysPAG SIG structure, which we are still discussing.

It is possible that a CMB probe could follow the X-ray or FIR probe, and so the PhysPAG would like to discuss how the interests of this group might be best served moving forward.

For now, we suggest **sunseting the current Inflation Probe SIG**.



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# R E Q U E S T S   F O R   T H E   A P A C

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## 1 Consider approval of these three SAGs

*Full Terms of Reference for all are in the Google Drive folder. We are ready to start work!*



The logo features a dark, circular graphic on the left, resembling a celestial body or a lens flare. To the right of this graphic, the text "GAMMA RAY TRANSIENT NETWORK" is written in a bold, sans-serif font. Below this, "SCIENCE ANALYSIS GROUP" is written in a smaller, similar font.



## 2 Consider recommending an acronym to replace “PCOS”

PCOS → **PHYSCOS**

## 3 Consider recommending that the PhysPAG’s Inflation Probe SIG be sunset.

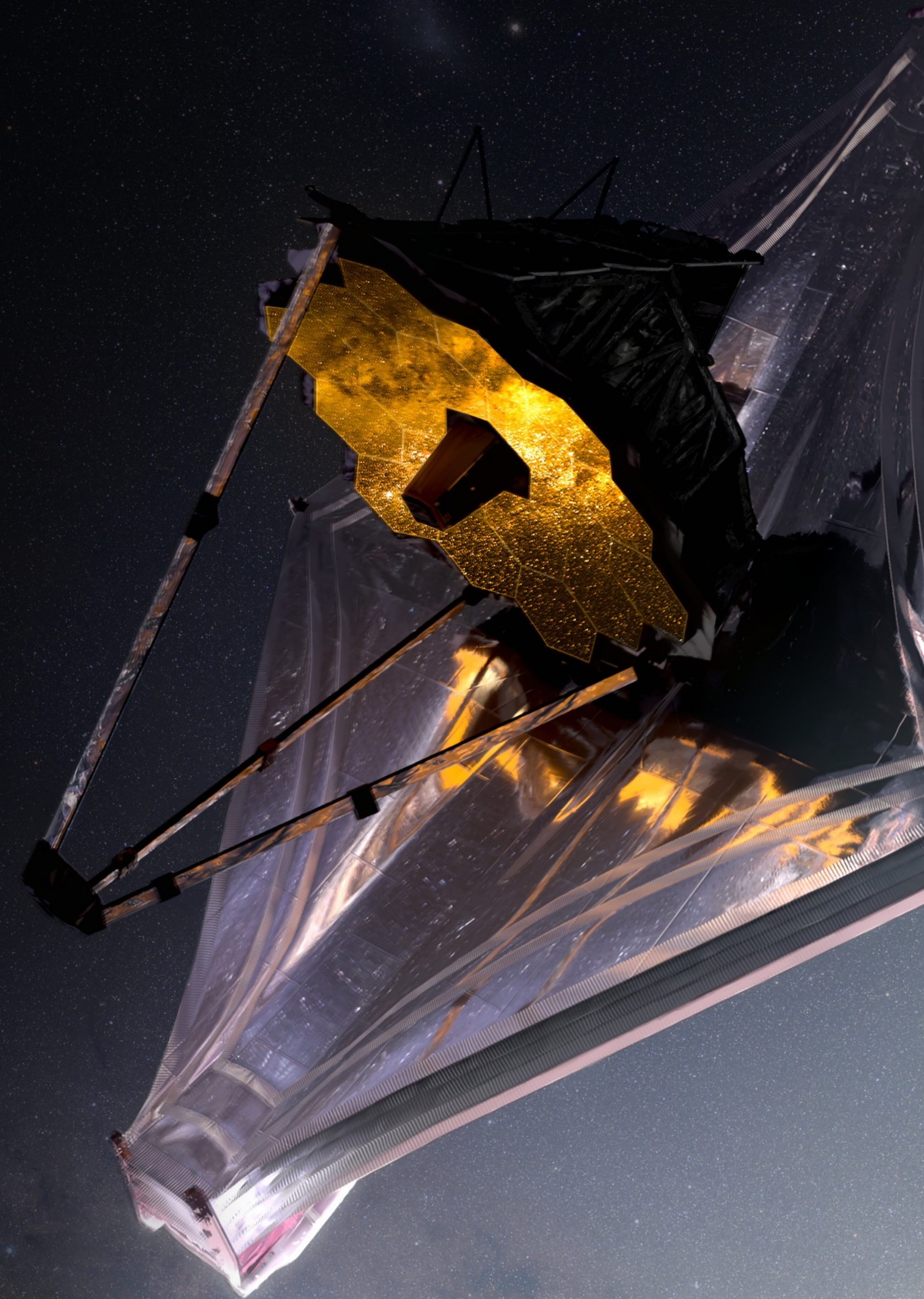


Welcome, Mark!





Thank you, all.





Thank you, Paul.

